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figures in the frog's egg in the direction of the force. This effect of the force is due apparently to compression of the alveolar framework of the egg, on one side by the fatty layer and on the other by the yolk layer.

Regeneration and Growth in Fishes: G. G. SCOTT, College of City of New York.

The caudal fin of 117 *Fundulus heteroclitus* of sizes varying from 4.57 cm. to 9.73 cm. long was removed. Fins of the younger fishes (shorter) regenerated proportionately more than the older (longer). In fact the curve representing the proportional amount of regeneration in fishes of different ages (lengths) was regularly descending, reminding one of curve of growth established by Minot. One might conclude that regeneration paralleled growth, i. e., that the power of regeneration is greater in the young. On closer examination we find that each fish (regardless of length) regenerated about 0.6 cm. The following explanation is offered: Regeneration of new fin tissue is due to proliferation outwards in a linear direction of new cells arising from the division of cells exposed by the line of amputation. A fish 5 cm. long contains same sized cells as a fish 10 cm. long and the probability is that the power of proliferation is about the same in the cells of fishes of each size—provided that the cells are at the same relative level in each case. When the amputation was made the author endeavored to have line of removal at same relative place in all specimens. Evidence as to the similar powers of regeneration residing in cells of same level independent of size (age) is shown by the fact that actual regeneration outwards in a linear direction is same in fishes of all sizes. This indicates that regeneration is a process independent of general growth processes. It comes into play under abnormal conditions.

The Early Development of Neurofibrillæ and Nerve Function: HANSFORD M. MACCURDY, Alma College, Alma, Mich.

With the purpose to find the earliest stage at which neurofibrillæ may be discovered in the developing nerve cells and the relation between their first appearance and the establishment of conduction paths as evidenced by the earliest normal movements and reactions to external stimuli, observations were made on the larvæ of *Rana* and *Amblystoma*. Neurofibrillæ are present in the earliest optic nerve fibers and in the retinal elements long before they can perform their regular function. That they are also present in early fiber tracts of the neural tube, preceding normal

movements seems amply demonstrated, but further confirmation is to be sought. It appears altogether probable that the neurofibrillæ arise practically contemporaneous with the outgrowth of the nerve fiber.

Regeneration in the Brittle-star Ophiucoma pumila, with Reference to the Influence of the Nervous System: SERGIUS MORGULIS, Cambridge, Mass.

1. Is the presence of the nerve essential for the regeneration of the arms in the brittle-star *Ophiucoma pumila*? To answer this question the radial nerve was injured by a red-hot needle near the disc, and then the arm was cut off about the middle of its length. As a control experiment another arm in the same specimen was also cut on at the middle, but its radial nerve was left intact. It was found that in the course of thirty days the arms with radial nerve intact had all regenerated normally, while those with the radial nerve injured produced only a very minute stump of new tissue. If, however, the arm broke off at the place where the nerve was injured—as occasionally happened soon after the operation—no tissue was regenerated from such an exposed surface, although arms in which the radial nerve was intact, even in the same animal, did regenerate.

2. What is the relation of the rate of regeneration to the "level" at which the arms are cut off? It was found that arms cut off at the base or at the middle regenerate much faster than those cut off at the tips.

3. What is the relation of the rate of regeneration to the number of arms removed? The removal of different numbers of arms influences the rate of regeneration of the lost arms only to a small extent; the rate of regeneration when four or five arms are removed is somewhat greater than when one, two or three arms are removed; but this correlation between the degree of injury and the rate of regeneration is not of the nature of a close parallelism.

MAURICE A. BIGELOW,
Secretary

TEACHERS COLLEGE,
COLUMBIA UNIVERSITY

SOCIETIES AND ACADEMIES

THE ANTHROPOLOGICAL SOCIETY OF WASHINGTON

THE 432d regular meeting of the society was held April 6, 1909, President Hough in the chair. The following program was presented:

New Chapters in the History of the Coconut Palm: Dr. O. F. COOK.

It has long been thought that the cocoanut palm presents a perfect example of adaptation to a littoral environment, but this idea is delusive. The tough outer rind which is popularly supposed to have been developed as a protection against sea water is really to guard the cocoanut when it falls, and give it favorable conditions for germination. Cocoanuts require a certain amount of salt in the soil, but this condition is satisfied by soils in some interior localities as well as on the seacoast. Considerable sunshine is also needed. This, however, is met better in arid regions than by a coastal habitat and the care with which the milk is protected would argue in the same direction. Far from being a wild plant the cocoanut does not appear to thrive long away from human beings and in spite of the supposed diffusion of the tree by oceanic currents no instance of the kind is known. A consideration of the varieties of cocoanut palms and the method of their occurrence points in the same direction. Against De Candolle's hypothesis of an old world origin for the cocoanut the speaker brought forward documentary evidence that this palm was spread much wider in America than De Candolle had supposed, so widely as to preclude the possibility of a recent introduction into America. On the other hand, certain Polynesian traditions were cited pointing to an eastern origin for the cocoanut trees among the inhabitants of the Pacific islands.

Mr. Safford in discussing the paper contended for an East Indian origin. He called attention to the intimate connection between this tree and the entire social and economic fabric of Polynesian culture. The absence of cocoanuts from Peruvian graves he considered a strong argument against an American origin and the Polynesian traditions cited by Dr. Cook, he thought, were due to the fact that the oceanic currents in the mid Pacific set westward, leaving wreckage, etc., upon the eastern coasts of the islands. While agreeing with the speaker regarding the origin of the cocoanut in an arid country and its adaptation to human needs through human agency Professor McGee believed that we are very far from the end of the problem which it presents. Dr. Folkmar also discussed the paper briefly and Dr. Cook made a short reply to the criticisms and questions.

Cannibalism in Polynesia: ARTHUR P. RICE.

Mr. Rice remarked upon the wide distribution of this custom and the fact that it had survived to modern times more particularly in Polynesia. Within this area, however, great differences are presented. While Fiji is the classic land of

cannibalism, the very next group, the Tonga Islands, lacked it entirely; it was a common practise in the Marquesas Islands, but held in abhorrence in Hawaii. In Fiji the custom was a part of the state religion and was demanded by the gods. Revenge upon enemies was the most constant reason for exercising it, but each island kept a black list from which victims were taken on occasion. Those who died a natural death and chiefs were never eaten. Cases were also cited from New Caledonia, the New Hebrides, Samoa and New Zealand. The absence of animals from which a sufficient meat diet could be obtained was cited as a probable stimulant to the great extension of cannibalism over the Pacific, and the modern introduction of such animal diet a contributing cause to its extinction. A partial compensation for the evils of this custom is to be found in the knowledge of human anatomy thereby acquired and the surgical skill resulting, for which the Maori, at least, were noted. The paper was discussed briefly by Dr. Swanton.

The meeting concluded with an exhibition of a collection of Chitimacha baskets recently acquired by the National Museum through Mrs. Sidney Bradford, of Avery Island, La., and an explanation of the designs upon these by the secretary of the society.

JOHN R. SWANTON,
Secretary

THE WASHINGTON CHEMICAL SOCIETY

THE 190th regular meeting of the society was held at the Cosmos Club on Thursday evening, April 8, President Walker in the chair. The attendance was 57.

Professor F. W. Clarke gave a talk in memory of Professor Wolcott Gibbs. Professor Munroe, Professor Chatard and Dr. Benjamin related some personal reminiscences of the noted chemist.

Announcement was made that a special meeting of the society would be held at the Johns Hopkins University at Baltimore on April 24. The society granted to the American Chemical Society a waiver of jurisdiction over Virginia, except that part of the state within a radius of twenty-five miles from Washington. Dr. F. C. Cook was appointed the delegate to represent the society at the Seventh International Congress of Applied Chemistry at London.

J. A. LE CLERC,
Secretary

BUREAU OF CHEMISTRY,
WASHINGTON, D. C.